

Complete Summary

GUIDELINE TITLE

Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment.

BIBLIOGRAPHIC SOURCE(S)

Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, Robinson TN, Scott BJ, St Jeor S, Williams CL. Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment. Circulation 2005 Apr 19; 111(15): 1999-2012. [103 references] [PubMed](#)

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE
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 RECOMMENDATIONS
 EVIDENCE SUPPORTING THE RECOMMENDATIONS
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SCOPE

DISEASE/CONDITION(S)

- Overweight
- Obesity

GUIDELINE CATEGORY

Management
 Prevention
 Treatment

CLINICAL SPECIALTY

Family Practice
Pediatrics
Preventive Medicine

INTENDED USERS

Health Care Providers
Physicians

GUIDELINE OBJECTIVE(S)

- To examine the pathophysiology and epidemiology of overweight in children and adolescents
- To present updated information on the adverse outcomes associated with childhood overweight and discuss approaches for the prevention and treatment of overweight in young individuals

TARGET POPULATION

- Infants, children, and adolescents in the general population (prevention)
- Overweight or obese children and adolescents with or without co-morbidities (prevention and treatment)

INTERVENTIONS AND PRACTICES CONSIDERED

Evaluation

1. Evaluation of growth
 - Height
 - Weight
 - Body mass index (BMI)
2. Medical history
3. Blood pressure measurement
4. Physical assessment for orthopedic abnormalities
5. Laboratory studies, including fasting lipoprotein profile, fasting glucose, liver enzymes, and hemoglobin A_{1c}
6. Sleep study
7. Echocardiography

Prevention

1. Breast-feeding (infants)
2. Establishing behavior targets for toddlers
 - Increased consumption of fruits and vegetables ("5-a-day")
 - Increased consumption of fiber-containing grain products
 - Switching from full-fat to 1% or fat-free dairy products after 2 years of age
 - Preparing and eating family meals at home
 - Increasing daily physical activity
 - Limiting sedentary time

3. Theory-based interventions including classroom curricula, physical education curricula, changes in school meals, vending machines, and cafeterias, and after-school programs (school-age children and adolescents)
4. Implementation of tailored strategies that are well matched to the social and cultural contexts of children in ethnic minority populations

Treatment

1. Age-specific dietary modification
2. Physical activity (30 to 60 minutes of regular exercise daily)
3. Pharmacological treatment (sibutramine, orlistat, leptin, metformin)
4. Surgical treatment
5. Development of long-term care model

MAJOR OUTCOMES CONSIDERED

- Morbidity
- Mortality
- Body mass index (BMI)
- Weight loss

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The authors acknowledge the participants in the Lloyd J. Filer Conference on Overweight and Its Consequences Beginning in Youth. The information presented by the speakers was quite useful for the writing group of this scientific statement:

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Expert peer review of American Heart Association (AHA) Scientific Statements is conducted at the AHA National Center. For more on AHA statements and guidelines development, visit [AHA Web site](#).

This statement was approved by the AHA Science Advisory and Coordinating Committee on February 22, 2005.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Comorbidities Related to Overweight in Youth

Please refer to the original guideline document for a discussion of comorbid conditions related to overweight that may present during childhood and adolescence including metabolic syndrome, type 2 diabetes mellitus, inflammation, cardiovascular abnormalities, and psychosocial abnormalities.

Medical Evaluation of Comorbidities

When an overweight child or adolescent is evaluated for medical reasons, it is important to consider potential comorbidities. A recommended approach to this evaluation is presented in the table below. This approach should help guide clinicians in identifying medical problems that may require attention in addition to the treatment of overweight.

Table: Medical Evaluation of a Child or an Adolescent who is Overweight

<p>Evaluation of growth: Normal growth makes metabolic or genetic form of overweight less likely:</p> <ul style="list-style-type: none"> • History of sleep-disordered breathing (e.g., snoring, nocturnal irregular breathing, diurnal somnolence) • History of irregular menstrual periods, acne, and hirsutism in adolescent girls (evidence of polycystic ovary syndrome) • Blood pressure measurement (with attention to proper cuff size) • Physical assessment for orthopedic abnormalities • Fasting lipoprotein profile • Fasting glucose, insulin • Liver enzymes
<p>Consider if evaluation suggests an abnormality:</p> <ul style="list-style-type: none"> • Glucose tolerance test • Sleep study • Echocardiographic evaluation of left ventricular mass, structure and function, and right-sided abnormalities related to increased pulmonary artery pressure • Hemoglobin A_{1c}

Prevention of Overweight

Potential interventions for obesity in youth span a continuum from preventing the development of obesity to treating established obesity and its complications. Treatment of obese children, discussed in the next section, can be a strategy for preventing adult obesity. Here, obesity prevention refers to avoiding the occurrence of obesity during childhood and adolescence. Obesity prevention includes both population-oriented and individual-oriented approaches, with an emphasis on population-oriented approaches. Population approaches focus on environmental and policy change (upstream approaches) that have the broadest reach and the lowest intensity and cost and are critical for reaching the least-advantaged population segments (see Figure in the original guideline document). Treatment interventions (downstream approaches) are individually oriented, usually delivered in specialty care, primary care, and health systems, and are more familiar to health professionals than is population-oriented intervention. Treatment approaches are important and appropriate for children who are already overweight. Individually oriented prevention approaches that focus on children at high risk of becoming overweight resemble treatment approaches in their process and delivery setting. The middle of the continuum in the Figure (see original guideline document) reflects this overlap between high-risk prevention and treatment approaches. Individually oriented prevention strategies may be highly

intensive, costly, and have low reach in terms of the numbers that can potentially be served.

Whereas formal treatment for overweight children and adolescents is delivered almost exclusively in medical settings, the settings in which preventive interventions function extend from medical settings to families and communities. Settings for preventive interventions include schools and other group childcare settings such as day care and Head Start services, maternal and child healthcare clinics, and the Supplemental Nutrition Program for Women, Infants, and Children (WIC) programs.

Prevention programs are more likely to be successful if they are based in theory. Although a theoretical orientation does not guarantee success, the absence of a theoretical model tends to lead to interventions that miss opportunities and interferes with the ability to translate specific approaches into general principles. A range of theories is relevant, from those addressing social and community change to those concerned with family functioning to individual cognitive and behavioral processes; however, several concepts are common across many of the models underlying successful interventions. First, the interventions must be designed with specific knowledge of the target audience and the best way to engage them in the process of change, whether the audience is individuals, families, organizations, or governments. This approach includes identifying the specific issues, social and cultural values, and incentives and disincentives that are most salient to the audience in question; factors that will increase the probability that the individual or group will pay attention to, participate in, and be motivated by the change process; exposure to models and practical experiences with regard to the actions relevant to change; and facilitators and barriers to change in the relevant structural and social environments and in the interactions among individuals, systems, and groups.

Identification of relevant differences among subgroups within the population helps to guide the nature of the intervention. "Tailoring" is a deliberate attempt to account for important individual or subgroup variables when developing program messages or intervention strategies. According to Rakowski, the process of tailoring involves identifying "focal points" for intervention - the interaction of behavior, population, and setting relevant to a given situation. One example of a focal point would be dinnertime (setting) reliance on quick food options (behavior) of working parents of children in day care (population or audience). At an environmental level, a focal point might be policy decisions (behavior) of city legislators (population or audience) related to ensuring safety on school playgrounds (setting). Many elements of tailoring are related to cultural variables - for example, culturally influenced attitudes toward breast-feeding (behavioral) among African American teenage mothers (population) who are clients of a New York City WIC program (setting). Needs assessment and process evaluation to identify elements of these focal points are critical in the development of effective intervention approaches. Defining an initial focal point is one stage of tailoring; the second stage involves further tailoring to individuals within this focal point on the basis of additional variables (e.g., household composition in the above example for parents, and regulatory orientation in the above example for policy makers). The definition of the focal points themselves may change as the heterogeneity within population groups becomes evident (e.g., recognizing

differences in attitudes about breast-feeding between US-born and Caribbean- or African-born mothers or between primiparous and multiparous mothers).

Population-Specific Approaches

For a public health approach, the most desirable prevention goal is to prevent children with a normal, desirable body mass index (BMI) (<85th percentile) from becoming at-risk-of-overweight or overweight. Other levels of prevention also apply to a lesser degree: primary prevention, aimed at preventing at-risk-of-overweight children from becoming overweight (BMI \geq 95th percentile), and secondary prevention, aimed at the treatment of overweight children to reduce comorbidities, reduce the severity of the problem, and normalize weight, if possible. Success is most likely to occur if appropriate prevention strategies and interventions are initiated throughout the life course, beginning in infancy. Strategies tailored to children in ethnic minority populations with a disproportionate risk of becoming obese are also needed.

Infants

Both initiation and duration of breast-feeding may reduce the risk of later overweight, in addition to the other benefits of breast feeding; however, not all studies have found breast-feeding to be protective against the future development of obesity. Breast-feeding is ideal nutrition and sufficient to support optimal growth and development for approximately the first 6 months after birth. Only 64% of mothers initiate breast-feeding, and the number of mothers who are still breast-feeding decreases to 29% by 6 months; only 17% of infants 4 to 6 months of age are still exclusively breast-fed. Rates of initiation and duration are even lower among African American women.

Promoting breast-feeding is a promising prevention strategy given its potential protective effect on later obesity and overall benefits for nutrition. Such efforts require more attention to the incentives and barriers that affect rates of breast-feeding by different subgroups within the population, including the social and environmental variables that support or discourage women's decisions to breast-feed. For example, cultural norms that discourage breast-feeding in public or workplace policies that do not permit women who return to work after childbearing to pump or store breast milk in clean and comfortable circumstances represent significant barriers to the duration of breast-feeding.

Toddlers

Early childhood is a time of rapid growth, development, and learning. Reasons to emphasize prevention in early childhood include adipocyte physiology, adiposity rebound, and the limited potential for reversing metabolic changes associated with overweight. Findings from the Healthy Start Preschool Study suggest that a reasonable goal for preschool interventions would be to aim toward weight gains of 2.5 lb/in (1.0 kg/2 cm) of growth. This rate of gain from preschool age (3 to 4 years) onward predicted desirable weight at 8 to 9 years of age, whereas a gain of 5 lb/in (1.8 kg/2 cm) predicted overweight at elementary school age. Strategies to achieve an optimal rate of pounds gained per inch might help families and children acquire the critical life skills to enable them to better balance energy intake (diet) with energy expenditure (physical activity). Goals are to work toward

establishing healthy environments at home, at school, and in the community that encourage families and children to practice and maintain the life skills that are conducive to maintaining a healthy weight.

The important role of parenting skills and teacher training in helping young children learn and practice healthful behaviors has increasingly been recognized. Behavior targets include increasing consumption of fruits and vegetables ("5-a-day"), increasing consumption of fiber-containing grain products, switching from full-fat to 1% or fat-free dairy products after 2 years of age, preparing and eating family meals at home, increasing daily physical activity (e.g., active play 1 h/d), and limiting sedentary time (e.g., watching television ≤ 2 h/d).

School-Age Children and Adolescents

Most efforts to prevent obesity among school-age children and adolescents have been implemented in school settings. There is ample evidence that theory-based interventions that include classroom curricula, physical education curricula, changes in school meals, vending machines, and cafeterias, and after-school programs, can increase physical activity and improve dietary patterns in children and adolescents. Many of these interventions have not successfully changed weight and body fat, however. Further research is needed to evaluate the specific reasons for this lack of change in body weight, including insufficient duration of the intervention and lack of consistent lifestyle changes outside school.

Additional attention paid to applying theoretical models to develop interventions that are more relevant and motivating to children has produced a growing body of theory-based interventions in schools that have successfully reduced weight gain and obesity. Two successful recent studies emphasized reducing television, videotape/DVD, and video game use. These interventions addressed school, family, peer, and cultural influences to maximize program adoption and implementation and to allow a sufficient "dose" of the intervention to be received by the participating schoolchildren. The underlying theoretical models prompted interventions that addressed changes in schools as a whole and administrator and teacher behaviors, in addition to the children's behaviors themselves. There are also successful examples of physical education interventions that have resulted in reductions in weight and fat gain by replacing the standard physical education curricula with higher-intensity or more motivating activities, specifically endurance training and popular dance. In contrast, increasing the duration and frequency of the standard physical education curricula alone has not resulted in changes in fitness or body composition.

Exposure to various media may be important in considering population-based prevention efforts. For example, a substantial proportion of the advertising on children's television promotes food, and there is a direct relationship between television viewing and obesity. Furthermore, reducing television viewing has reduced weight gain and the prevalence of obesity in experimental trials. It has been hypothesized that television promotes obesity through the consumption of food while watching television, the consumption of foods advertised on television, or reduced physical activity. Food advertising has become a particularly controversial issue. The Kaiser Family Foundation recently suggested that the relationship between television viewing and overweight in childhood was mediated by the effect of televised food advertising directed at children, and the American

Psychological Association called for a ban on all televised advertising directed at children <8 years old. The conclusions of all of the bodies that reviewed this literature, however, have not been consistent. Despite supporting evidence, there is insufficient causal evidence to definitively link advertising directly with childhood obesity.

Children in Ethnic Minority Populations

The challenge of obesity prevention includes the need to develop tailored strategies that are well matched to the social and cultural contexts of children in ethnic minority populations with a high risk of obesity. Eating, activity, and perceptions of weight and health are strongly influenced by cultural norms and culturally influenced attitudes and values. The relevant variables can be considered from programmatic, child, familial, and environmental perspectives that are then each specified along multiple related dimensions such as ethnic identification and related cultural attitudes, beliefs, and values; family and household characteristics; and socioeconomic status variables. Theoretical guidance to inform systematic approaches to developing culturally specific prevention strategies is available but not yet fully used or developed in relation to the specifics of obesity prevention.

Culturally adapted obesity prevention studies in ethnic minority populations identify strategies that deserve further testing. Culturally specific programming tends to shift control to the client population and challenges providers to acknowledge their own personal and professional cultural concepts and biases. A fundamental issue is whether the social and familial relationships and cultural practices that define patterns of daily living in the client population are viewed as targets for change, as difficulties to be overcome, or as positive forces that can be leveraged in favor of the programmatic goals. Other important issues are the respective roles of those from inside versus outside the communities of interest and the ability to sustain over the long term programs that are well received and effective in the short term.

Adaptation to ethnically based cultural perspectives is not the only consideration for effective health interventions. As discussed previously, any program should be otherwise theoretically sound. In addition, cultural factors related to obesity prevention are not solely defined along ethnic lines. Cultural variation related to age, generation, and gender is highly relevant to obesity-related norms, attitudes, and practices. The cultural context for obesity prevention also includes mainstream cultural forces such as media that are targeted differently to different demographic groups.

Setting-Specific Approaches

Setting-specific approaches target institutions that provide access to groups of children. Potential childhood obesity prevention settings include schools, Head Start programs, and other centers where preschoolers participate in groups; homes, where preschool children are cared for by parents and other caregivers; healthcare settings, where growth and weight status are routinely monitored; industries that develop television programs and other media, print books, and toys for preschoolers; and community and government programs and policies that affect families with young children. Typical interventions in physical settings are

based on individual behavioral theories and designed to enhance motivation and teach behavior-change skills in large groups. In group settings, hands-on experiences with food or activity are often provided on site. Interventions in health care that teach providers effective counseling or deliver additional services can be effective, but there are significant barriers to implementation in such settings. Overall, a strength of setting-specific approaches is the ability to intervene in the setting itself--in other words, to consider the setting as an environment in which policies and practices can be changed to enable targeted behaviors and discourage competing behaviors. The key limitations of setting-specific approaches are that they reach a limited portion of the population and they do not coordinate strategies or messages across settings.

Community-wide approaches include coordinated interventions in multiple settings and may include mass media components. An underlying concept is that behavior-change interventions in multiple sectors, reaching many segments of the population, are needed to create population change. The effectiveness of community-wide interventions is not well established, however.

Environmental and policy approaches are based on the concept that education and motivational interventions will be more effective in social and physical environments where healthful choices are the easier choices. Relevant environments include physical (what is available and promoted; e.g., food choices in homes, fast food advertisements on television, opportunities for or barriers to physical activity); economic (financial factors; e.g., the price of soda versus water, subsidies to sugar farmers); policy (rules; e.g., school food service standards, regulations on marketing that targets young children); and sociocultural (attitudes, perceptions, beliefs, and values such as fast food, everyday food, personal responsibility, and the ethos of governments).

Treatment of Overweight

The principal strategies for the treatment of overweight in children are similar to those for adults (dietary modification and increased physical activity), with treatment goals based on age, severity of obesity, and the results of risk factor assessment. With its emphasis on acute short-term interventions, contemporary healthcare delivery is often not well suited to meet the long-term needs of overweight children and their families. Support for family-based nutrition and behavior-management programs to teach long-term self-management skills is lacking. Guidelines for the treatment of overweight in children are based on age, degree of overweight, and presence of associated comorbidities (see table below titled "Weight Management and Treatment Goals Based on BMI Percentile and Health Status"). For children with BMI >85 th percentile, there are 3 potential goals for weight management depending on age and the level of BMI: (1) slowed rate of weight gain to achieve BMI maintenance, (2) weight maintenance to improve BMI with increasing height, and/or (3) gradual weight loss at a rate of 1 to 2 kg/month to improve BMI. Very young children (2 to 4 years old) who are overweight will achieve reductions in BMI percentile by achieving a rate of weight gain <1 kg/2 cm of linear growth. Older children (≥ 4 years old) who are at risk for overweight (BMI 85th to 95th percentile) or who are overweight (BMI ≥ 95 th percentile) without comorbidities may achieve BMI percentile reductions to <85 th percentile with BMI maintenance or more rapidly with weight maintenance during linear growth. Children classified as overweight (BMI ≥ 95 th percentile) with

comorbidities require an individualized approach based on the severity of comorbidities and a consideration of the importance of weight loss in conjunction with other treatment modalities. When weight loss is necessary, slow weight loss is recommended for several reasons: (1) The goal is achievable and, with success, provides positive feedback for children who often have low self-esteem, (2) slow weight loss requires a substantial decrease in calorie intake for children who are still growing and who often have been gaining 20 to 40 lb/y, and (3) the diet adapted to meet a gradual weight loss goal is more easily sustained over a long period. Older adolescents who have completed linear growth and have a BMI ≥ 30 kg/m² require more aggressive weight loss similar to that for adults to reduce their long-term risk. Occasionally, physically fit children have increased BMI secondary to increased lean body mass as opposed to fat mass; these children do not need to reduce BMI percentile to the same target goal as children with greater fat mass.

Table: Weight Management and Treatment Goals Based on BMI Percentile and Health Status

BMI Status	Classification	Treatment Goal
<85th percentile	Normal weight for height	Maintain BMI percentile to prevent obesity
85th to 95th percentile	At risk for overweight	<ul style="list-style-type: none"> • Maintain BMI with aging to reduce BMI to <85th percentile • If BMI >25 kg/m², weight maintenance
≥ 95 th percentile	Overweight	Weight maintenance (younger children) or gradual weight loss (adolescents) to reduce BMI percentile
≥ 30 kg/m ²	Adult obesity cut point	Gradual weight loss (1 to 2 kg/month) to achieve healthier BMI
≥ 95 th percentile and comorbidity present*	Overweight with comorbidity	<ul style="list-style-type: none"> • Gradual weight loss (1 to 2 kg/month) to achieve healthier BMI • Assess need for additional treatment of associated conditions

*See previous table titled, "Medical Evaluation of a Child or an Adolescent Who is Overweight."

Guiding Principles

Five guiding principles are important for the treatment of overweight. These guiding principles can be summarized as follows:

1. Establish individual treatment goals and approaches based on the child's age, degree of overweight, and presence of comorbidities.
2. Involve the family or major caregivers in the treatment.
3. Provide assessment and monitoring frequently.
4. Consider behavioral, psychological, and social correlates of weight gain in the treatment plan.

5. Provide recommendations for dietary changes and increases in physical activity that can be implemented within the family environment and that foster optimal health, growth, and development.

Children <85th percentile with no other health risk factors should be screened (weight, height, and BMI percentile calculated and plotted) every year. Identification of risk for overweight before adolescence is encouraged so that health habits can be improved at a stage of increased parental influence and control. Treatment of overweight should rarely be instituted before 2 years of age because of the rapid growth and development that occurs during these early years and lower correlation with overweight in later years. As more is learned about the prevention of overweight, however, the focus on these early years of life may become critical. Importantly, primary care providers should assess diet and activity habits at annual well-child visits; this should be routinely integrated into the overall care plan.

Family involvement is critical in the treatment of childhood overweight. If treatment is initiated when a family is not ready to support the program, then success is unlikely. The treatment planned should also take into consideration long-term management with the continued assessment of the child for adequate growth and development because overweight is a long-term problem.

Dietary Management

Age-specific dietary modification is the cornerstone of treatment. The major goals in dietary management are to provide appropriate calorie intake, provide optimum nutrition for the maintenance of health and normal growth, and to help the child develop and sustain healthful eating habits. The most recent Dietary Reference Intakes recommend a fat intake of 30 to 40% kcal in children 1 to 3 years old, with a reduction to 25 to 35% in children 4 to 18 years old (compared with 20 to 35% in adults); a carbohydrate intake of 45 to 65% kcal in all children and adults; and protein intakes of 5 to 20% kcal in children 1 to 3 years old with gradual increase to 10 to 30% kcal in children 4 to 18 years old (compared with 10 to 35% kcal in adults).

Assessment begins with an understanding of the child's dietary pattern before any modifications are imposed. Estimated energy requirements vary throughout childhood and reflect large increments with a range of 570 to 3,152 kcal/d for boys and 520 to 2,368 kcal for girls from age 3 months to 16 years. In addition, caloric needs may vary widely even for children of the same age because of normal differences in size. Thus, individualizing the calorie-intake recommendation and monitoring weight change are essential. Healthcare professionals must help parents or caregivers recognize and prevent overeating. Additional dietary recommendations should include providing adequate nutrition by offering a variety of foods that are low in saturated fat (<10% kcal), total fat (approximately 30% kcal), and cholesterol (<300 mg/d); promoting age-appropriate serving sizes including ≥ 5 servings of fruit and vegetables, ≥ 3 servings of milk or dairy products, and ≥ 6 servings of whole-grain and grain products per day; consuming adequate amounts of dietary fiber (age in years + 5 g/d). Limiting the intake of salt (<6 g/d) and sugar to follow recommended healthier lifelong dietary habits is also important.

Because it is difficult for parents to judge calorie intake and energy expenditure on a regular basis, it is necessary to help parents guide the diet and physical activity patterns of their children. Counseling and recommendations must be made within the context of the family's culture, living environment, and socioeconomic status. Most dietary strategies for weight loss emphasize balance, variety, and adequacy of the overall eating pattern. Appropriate food portion sizes are recommended for children at varying ages to guide appropriate intake and are critical in the education process. Dietary recommendations also emphasize reducing the number of meals eaten outside the home, planning for healthy snacks, offering healthier, low-calorie food choices (especially fruit and vegetables), and structuring eating times and places for family meals. Involving children in meal planning, shopping, gardening, and preparation of food has been promoted, along with including all caregivers (including grandparents) in helping the child to adhere to recommended consumption patterns and healthier food choices.

Physical Activity

Most reports of successful weight loss and maintenance emphasize the importance of incorporating regular physical activity into treatment programs. Children are similar to adults in that regular exercise provides additional health benefits for overweight individuals, including prevention of future risk acquisition, improved insulin sensitivity, blood pressure reduction, and improved socialization through group participation in activities. Regular physical activity is critical for the prevention of abnormal weight gain and weight maintenance. The current recommendation for the amount of physical activity is 30 to 60 minutes of regular exercise daily. "Working up a sweat" during the activity suggests adequate effort expended. These recommendations apply to children of normal weight as well as to children who are overweight.

Young children should not and many adolescents will not exercise simply to lose or maintain weight. Recommended activities must be enjoyable and congruent with the child's and family's lifestyle and be rewarding independent of the health benefit. Activities such as playing hopscotch, riding bicycles, skating, walking the dog, participating in marching band, jumping rope with friends, dancing, climbing, weightlifting structured to improve endurance, training during the off-season, and gardening may be more easily integrated into a child or teen's lifestyle than would be simply recommending participation on organized sports teams (these often do not provide sufficient exercise). A complementary approach is to restrict sedentary free-time activities to <2 h/d.

Fitness levels vary significantly among overweight individuals. Whereas one child may not be able to walk several blocks without becoming short of breath, another may be adept at playing sports. Other variables also influence the recommendation for a child's physical activity and exercise program. Some may have easy access to recreational areas and play and exercise equipment, whereas others may not be allowed out of the house for safety reasons. Parental supervision and availability for participation vary greatly and must be considered.

Pharmacological Treatment

Data supporting the use of pharmacological therapy for pediatric overweight are limited and inconclusive. Sibutramine has been studied in a randomized controlled trial of severe obesity. It has been shown to be efficacious as compared with behavior therapy alone, but it may be associated with side effects including increases in heart rate and blood pressure. Orlistat is approved for use in adolescence. The efficacy of orlistat has not been tested extensively in young patients. Orlistat is associated with gastrointestinal side effects and requires fat-soluble vitamin supplementation and monitoring. For rare genetic and metabolic disorders, pharmacological treatment may be useful. For example, recombinant leptin is useful in hereditary leptin deficiency. Octreotide may be useful in hypothalamic obesity. Metformin, used to treat type 2 diabetes mellitus, has been used in insulin-resistant children and adolescents who are overweight, but long-term efficacy and safety are unknown.

Surgical Treatment

Surgical approaches to treat severe adolescent obesity are being undertaken by several centers. Indications used include a BMI $>40 \text{ kg/m}^2$ and severe associated comorbidities, such as obstructive sleep apnea, type 2 diabetes mellitus, and pseudotumor cerebri. More severe elevation of BMI ($>50 \text{ kg/m}^2$) may be an indication for surgical treatment in the presence of less severe comorbidities such as hypertension and dyslipidemia, particularly if the degree of overweight hinders performing the activities of daily living. An experienced team approach including comprehensive medical and psychological evaluation is critical both for selection of appropriate candidates and for postoperative care that is sophisticated and often intense. Weight loss goals and reduction of morbidity are often achieved with gastric bypass surgery. The rates of short-term mortality appear to be low, but significant complications can occur. Intermediate and long-term outcomes, including information on malabsorption of critical nutrients, are unknown. Overall, surgical therapy should be reserved for full-grown adolescents with the severest obesity-related morbidity, offered only by experienced multidisciplinary teams, and presented to families with appropriate informed consent procedures.

Healthcare Delivery Systems

Obesity treatment and prevention require a long-term care model. Substantial changes in the current healthcare delivery system are needed to accommodate the needs of long-term weight management for children as they grow. Children are at risk for not receiving appropriate intervention when physical growth and maturation occur simultaneously and when important lifelong nutrition and physical activity habits are formed. Emphasis should be placed on self-management, in which the child and his or her family (rather than the healthcare provider) set the goal. It is important that children and patients in treatment understand the implications of their choices through a problem-solving approach and that strategies be tailored to individual needs. The effectiveness of this long-term care model is also dependent on a comprehensive team approach that targets the individual, the family, and the many environmental influences affecting the child's behaviors.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

The short- and long-term association of obesity with morbid outcomes raises the level of importance for understanding overweight as a major public health concern for children and adolescents. Prevention and treatment of overweight and obesity in children and adolescents may help prevent these adverse outcomes.

POTENTIAL HARMS

- Sibutramine has been studied in a randomized controlled trial of severe obesity. It has been shown to be efficacious as compared with behavior therapy alone, but it may be associated with side effects including increases in heart rate and blood pressure.
- Orlistat is associated with gastrointestinal side effects and requires fat-soluble vitamin supplementation and monitoring.
- The rates of short-term mortality appear to be low, but significant complications can occur with surgical treatment of obesity. Intermediate and long-term outcomes, including information on malabsorption of critical nutrients, are unknown.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, Robinson TN, Scott BJ, St Jeor S, Williams CL. Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment. *Circulation* 2005 Apr 19; 111(15): 1999-2012. [103 references] [PubMed](#)

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2005 Apr 19

GUIDELINE DEVELOPER(S)

American Heart Association - Professional Association

SOURCE(S) OF FUNDING

American Heart Association

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American Heart Association (AHA) makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

Table: Authors' Disclosures

Writing Group Member Name	Employment	Research Grant/ Other Research Support	Speakers Bureau/ Honoraria	Stock Ownership	Consultant/Advisory Board	Other
Stephen R. Daniels	Cincinnati Children's Hospital	None	None	None	Abbott Laboratories	None
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Marc Jacobson	Pending					

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